May to confift of 28 Days, taking from it 3 Days: *June* to have 29 Days, taking from it but one Day: *July* to confift of 28 Days, taking from it 3 Days : *Auguft* to to confift of 28 Days, taking from it three Days: All which Days fubftracted make Ten Days. In the which Four Months no Feftival Day is changed, but remain upon the accuftomed Days of their Months.

And becaufe the Roman Calendar hath joined to it a great Company of Rules, of which only are capable the skilful Computifts or Aftronomers, it is thought good to make a fhortTable like an Ephemerides, to continue the certainty of all the Feafts moveable, depending only upon *Eafter*, and agreeing with the Roman Calendar : which may ferve for an Hundred or Two Hundred Years, and fo eafily renewed, as we fee yearly Almanacks are, if the Sins of the World do not haften a Diffolution.

Whereupon her Majefty may pleafe upon Report to commit it to Confideration of Council, whether fhe will have this Reformation publifhed : which if fhe will, it were expedient, that it were done by Proclamation from her Majefty, as thereunto advifed, and allowed by the Archbifhops and Bifhops, to whofe Office it has always belonged to determine and eftablifh the Caufes belonging to Ecclefiaftical Government.

III. *Reflexions made on the foregoing Paper by Mr.* John Greaves, Savilian *Profeffor of Aftronomy in the Univerfity of* Oxford. 1645.

THis Reformation of the Roman Calendar, Propofed by Mr. *Dee*, as I cannot wholly approve, fo I cannot altogether difapprove. For I like the Subtraction of Ten Days, as the Church of *Rome* has done, beginning the Computation from the Council of *Nice* :
though

though it cannot be denyed, but that the Reformation from the time of our Saviour had been much better But since the Fathers of the Council of *Nice* thought it more Wisdom to look forwards, than to look backwards, and to have greater Care of avoiding Distractions in the Church, about the Celebration of *Easter* for the future, than to remedy the Errors past : I think we shall do well, with the Church of *Rome* to follow their Example. And whereas some have thought of a more exact Calculation, than this Emendation, introduced by Pope *Gregory* the xiii*th*. which they ground upon the late Astronomical Observations of the learned *Tycho Brahe* : yet since the Difference is not so great, as to make any sensible Error in many Ages, and since that Error may be easily corrected by the Omission of an intercalary Day, I think it not fit for so small a nicety to make a new Dissension in the Church. Much less am I of their Opinion, who think this Correction of the Year therefore to be rejected, because it comes recommended by the Church of *Rome* : which were all one to refuse some wholsom Potion, because it is prescribed by a Physician whose Manners we approve not of. And thus far I assent to Mr. *Dee*.

But I cannot subscribe to his Opinion, that this Reformation should be made by the subtraction of ten days out of one year alone. For tho' I grant, that this were a quick cure of a lingring Disease, yet it is against all Rules of Art in curing one malady to make Ten. For it cannot be, but that the Defalcation of Ten Days in one Year must be of infinite Disturbance in the Common wealth in all Contracts, where necessarily a certain time is defined. And therefore when *Julius Cæsar* the Dictator corrected the Roman Year by the help of *Sosigines*, a Mathematician, after this manner, that is, by Subtraction of Days, that Year, in which he did it, was called by the Antients *Annus Confusionis* : by Reason of the great

Con-

Confuſions and Inconveniences, which thereby hapned : and I doubt not, but that the Year 1582. in which the Defalcation of Ten Days was made by the Bull or Edict of Pope *Gregory*, might juſtly alſo be ſtyled *Annus Confuſionis*. But ſuch Examples, as theſe, are not to be imitated. For what *Cæſar* did as Dictator, or what *Gregory* the xiiith. did as Pope, the one by the Power of the Temporal Sword, the other of the Spiritual Sword, is not to be practiſed by Gracious Princes.

I ſhall therefore humbly recommend to His Majeſty's Wiſdom, and favourable Conſideration, that Courſe, which was long ſince propoſed by many able Mathematicians to Pope *Gregory*, upon the firſt Notice of his Purpoſe of Correcting the Calendar ; which if it had been known, either to Mr. *Dee*, or to his Learned Judges, or to the Wiſe and Honourable Lord *Burleigh*, the Reformation with us had long ſince been finiſhed, and not one Man prejudiced in his Eſtate. The manner was this ; that for Forty Years ſpace there ſhould be no Biſſextile or intercalary Years, or as we call them Leap-years, inſerted in the Calendar. By which courſe it is moſt evident, that ten Days will be Subtracted in forty Years, and theſe forty Years will be each of them *anni æquabiles*, conſiſting of 365 Days, as our common and ordinary Years do, without any alteration in the whole Year. And this being beyond all Exception, had been readily entertained by Pope *Gregory*, had not his Ambition been greater than his Judgment ; for he was willing to have the Honour of this Emendation, and not to leave it to his Succeſſors ; whereby the Year ever ſince has been called *Annus Gregorianus*. My Opinion therefore is, that by His Majeſty's Letters Patents, ſome Skilful Aſtronomer ſhould be appointed to have the Compiling and Publiſhing, within His Majeſty's Dominions, of all Calendars and Almanacks for forty Years, in which ſpace, by omitting the Intercalations, we ſhall at length
come

come to agree with the account of the Church of *Rome* : and every Year, during this time of Forty Years, fhall be as this prefent Year 1645. and as thofe of 1646. and 1647. will be in the ufual and ordinary computation.

III. *A Calculation of the Credibility of Human Teftimony.*

MOral *Certitude Abfolute*, is that in which the Mind of Man entirely acquiefces, requiring no further Affurance : As if one in whom I abfolutely confide, fhall bring me word of 1200 *l* accruing to me byGift, or aShipsArrival ; and for which therefore I would not give the leaft valuable Confideration to be Enfur'd.

Moral Certitude Incompleat, has its feveral Degrees to be eftimated by the Proportion it bears to the *Abfolute.* As if one in whom I have that degree of Confidence, as that I would not give above One in Six to be enfur'd of the Truth of what he fays, fhall inform me, as above, concerning 1200 *l* : I may then reckon that I have as good as the Abfolute Certainty of a 1000 *l*, or five fixths of Abfolute Certainty for the whole Summ.

The *Credibility* of any *Reporter* is to be rated (1) by his *Integrity*, or Fidelity ; and (2) by his *Ability* : and a double *Ability* is to be confidered ; both that of *Apprehending*, what is deliver'd ; and alfo of *Retaining* it afterwards, till it be tranfmitted.

"What follows concerning the Degrees of Credi-
"bility, is divided into *Four Propofitions.* The *Two Firft*,
"refpect the *Reporters* of the Narrative ; as they either
"Tranfmit *Succeffively*, or Atteft *Concurrently*: the *Third*,
"the *Subject* of it ; as it may confift of feveral *Articles* :
"and the *Fourth*, *joins* thofe three Confiderations to-
"gether, exemplifying them in *Oral* and in *Written*
"Tradition.

Hhh   *Pro-*

PROPOS. I.

Concerning the Credibility of a Report, made by Single
Succeſſive *Reporters, who are equally Credible.*

LET their Reports have, each of them, Five Sixths
of Certainty ; and let the firſt Reporter give me a
Certainty of a 1000 *l,* in 1200 *l*: it is plain that the Se-
cond Reporter, who delivers that Report, will give me
the Certainty but of ⅚*ths,* of that 1000 *l* or the ⅚*th* of
⅚*ths* of the full Certainty for the whole 1200 *l.* And
ſo a Third Reporter, who has it from the ſecond, will
tranſmit to me but ⅚*ths* of that Degree of Certainty,
the Second would have deliver'd me *&c.*

That is, if, *a,* be put for the Share of Aſſurance a
ſingle Reporter gives me ; and, *c,* for that which is want-
ing to make that Aſſurance compleat ; and I therefore
ſuppos'd to have $\frac{a}{a+c}$ of Certainty from the Firſt

Reporter ; I ſhall have from the Second, $\frac{aa}{\overline{a+c}^2}$;from the

Third, $\frac{a^3}{\overline{a+c}^3}$.

And accordingly if, *a,* be = 100 ; and *c* = 6, (the
number of Pounds that an 100*l,* put out to Intereſt brings
at the Years end ;) and conſequently my Share of Cer-
tainty from One Reporter, be = $\frac{100}{106}$; which is the pre-
ſent value of any Summ to be paid a Year hence : The
Proportion of Certainty coming to me from a Second,
will be $\frac{100}{106}$ multiplied by $\frac{100}{106}$, (which is the preſent Va-
lue of Money to be paid after two Years ;)and that from
a Third-hand Reporter, = $\frac{100}{106}$, thrice multiplied into
itſelf ; (the Value of Mony payable at the end of Three
Years,) *&c.*

Corollary.

And therefore, as at the Rate of *6 per Cent*
In-

Intereſt the preſent Value of any Summ payable after Twelve Years, is but half the Summ: So if the Probability or Proportion of Certitude tranſmitted by each Reporter, be $\frac{100}{105}$; the Proportion of Certainty after Twelve ſuch Tranſmiſſions, will be but as a half; and it will grohw by tat Time an equal Lay, whether the Report be true or no. In the ſame Manner, if the Proportion of Certainty be ſet at $\frac{100}{101}$, it will come to a half from the 70th Hand: And if at $\frac{1000}{1001}$, from the 695th.

PROPOS. II.

Concerning Concurrent *Teſtifications.*

IF Two Concurrent Reporters have, each of them, as $\frac{5}{6}$ths of Certainty; they will both give me an Aſſurance of $\frac{35}{36}$ths, or of 35 to one: If Three; an Aſſurance of $\frac{215}{216}$, or of 215 to one.

For if one of them gives a Certainty for 1200 *l*, as of $\frac{5}{6}$ths; there remains but an Aſſurance of $\frac{1}{6}$th, or of 200 *l* wanting to me, for the whole. And towards that the Second Atteſter contributes, according to his Proportion of Credibility: That is to $\frac{5}{6}$ths of Certainty before had, he adds $\frac{5}{6}$ths of the $\frac{1}{6}$th which was wanting: So that there is now wanting but $\frac{1}{6}$th of a $\frac{1}{6}$th, that is $\frac{1}{36}$th; and conſequently I have, from them both, $\frac{35}{36}$ths of Certainty. So from Three, $\frac{215}{216}$, *&c.*

That is, if the Firſt Witneſs gives me $\frac{a}{a+c}$ of Certainty, and there is wanting of it $\frac{c}{a+c}$; the Second Atteſter will add $\frac{a}{a+c}$ of that $\frac{c}{a+c}$; and conſequently leave nothing wanting but $\frac{c}{a+c}$ of that $\frac{a}{a+c}$, $=\frac{c^2}{\overline{a+c}^2}$. And in like manner the third Atteſter adds his $\frac{a}{a+c}$ of that $\frac{c^2}{\overline{a+c}^2}$, and leaves wanting only $\frac{c^3}{\overline{a+c}^3}$. &c.

Hhh 2

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Corollary.

Hence it follows, that if a fingle Witnefs fhould be only fo far Credible, as to give me the Half of a full Certainty ; a Second of the fame Credibility, would (joined with the firft) give me $\frac{3}{4}$ths.; a Third, $\frac{7}{8}$ths; &c: So that the Coatteftation of a Tenth, would give me $\frac{1023}{1024}$ths of Certainty; and the Coatteftation of a Twentieth, $\frac{2096999}{2097000}$ths or above Two Millions to one. &c.

PROPOS. III.

Concerning the Credit of a Reporter for a Particular Article *of that Narrative, for the whole of which he is Credible in a certain Degree.*

LET there be Six Particulars of a Narrative equally remarkable : If he to whom the Report is given, has $\frac{5}{6}$ths of Certainty for the whole, or Summ, of them ; he has 35 to one, againft the Failure in any One certain Particular.

For he has Five to One, there will be no Failure at all : And if there be ; he has yet another Five to One, that it falls not upon that fingle Particular of the Six. That is, he has $\frac{5}{6}$ths of Certainty for the whole: and of the $\frac{1}{6}$th wanting he has likewife $\frac{5}{6}$ths, or $\frac{5}{36}$ths of the whole more ; and therefore that there will be no Failure in that fingle Particular, he has $\frac{5}{6}$ths and $\frac{5}{36}$ths of Certainty, or $\frac{35}{36}$ths of it.

In General, if $\frac{a}{a+c}$ be the Proportion of Certainty for the whole ; and $\frac{m}{m+n}$ be the chance of the reft of the particular Articles m, againft fome one, or more of them n; there will be nothing wanting to an abfolute Certitude, againft the not failing in Article, or Articles, n, but only $\dfrac{nc}{m+n \times a+c}$

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PROPOS. IV.

Concerning the Truth of either Oral or Written Tradition, (in Whole, or in Part,) Successively transmitted, and also Coattested by several Successions of Transmittents.

(1) SUppofing the Tranfmiffion of an *Oral* and *Narrative* to be fo performed by a Succeffion of Single Men, or joined in Companies, as that each Tranfmiffion, after the Narrative has been kept for Twenty Years, impairs the Credit of it a *th* part; and that confequently at the Twelfth Hand, or at the end of 240 Years, its Certainty is reduced to a Half; and there grows then an even Lay *(by the Corollary of the fecond Propofition)* againft the Truth of the Relation : Yet if we further fuppofe, that the fame Relation is Coattefted by Nine other feveral Succeffions, tranfmitting alike each of them; the Credibility of it when they are all found to agree, will *(by the Corollary of the firft Propofition)* be as $\frac{1023}{1024}$ of Certainty, or above a Thousand to One; and if we fuppofe a Coatteftation of Nineteen, the Credibility of it will be, as above Two Millions to One.

(2) In Oral Tradition as a Single Man is fubject to much Cafuality, fo a Company of Men cannot be fo eafily fuppos'd to join ; and therefore the Credibility of $\frac{100}{101}$*ths*, or about $\frac{19}{20}$*ths*, may poffibly be judged too high a Degree for an Oral Conveyance, to the Diftance of wenty Years. But in *written Tradition* the Chances againft the Truth or Confervation of a fingle Writing are far lefs; and feveral Copies may alfo be eafily fuppos'd to concur ; and thofe fince the Invention of Printing exactly the fame : feveral alfo diftinct Succeffions of fuch Copies may
be

be as well suppos'd, taken by different Hands, and, preserv'd in different Places or Languages.

And therefore if Oral Tradition by any one Man or Company of Men might be suppos'd to be Credible, after Twenty Years, at $\frac{19}{20}$*ths* of Certainty ; or but $\frac{9}{10}$*ths* ; or $\frac{3}{4}$*ths* : a Written Tradition may be well imagin'd to continue, by the Joint Copies that may be taken of it for one Place, (like the several Copies of the same Impression) during the space of a 100, if not 200 Years ; and to be then Credible at $\frac{100}{101}$*ths* of Certainty, or at the Proportion of a Hundred to One. And then, seeing that the Successive Transmissions of this $\frac{100}{101}$ of certainty, will not diminish it to a H,al until it passes the Sixty ninth Hand ; (for it will be near Seventy Years, before the Rebate of Money, at that Interest, will sink it to half :) It is plain, that written Tradition, if preserv'd but by a single Succession of Copies, will not lose half of its full Certainty, until Seventy times a Hundred (if not two Hundred) Years are past ; that is, Seven Thousand, if not Fourteen Thousand Years ; and further, that, if it be likewise preserv'd by Concurrent Successions of such Copies, its Credibility at that Distance may be even increas'd, and grow far more certain from the several agreeing Deliveries at the end of Seventy Successions, than it would be at the very first from either of the Single Hands.

(3) Lastly in stating the Proportions of Credibility for any Part or Parts of a Copy, it may be observ'd ; that in an Original not very long, good Odds may be laid by a careful Hand, that the Copy shall not have so much as a Literal Fault : But in one of greater Length, that there may be greater Odds against any Material Error, and such as shall alter the Sense ; greater yet, that the Sense shall not be alter'd in any considerable Point ; and

still

ſtill greater, if there be many of theſe Points, that the
Error lights not upon ſuch a ſingle Article; *as in the
Third Propoſition.*

IV. *Part of a Letter from Dr.* Hotton *to Dr.*
Tancred Robinſon, *Concerning the late* Swam-
merdams *Treatiſe* de Apibus; *the* Ahmella
Ceylonenſibus, *and the* Faba Sti. Ignatii.

IT A eſt, damnabat ſua ſtudia ὁ μακαρίτης *Swammerda-
mius* noſter; erat enim Sectæ *Antoniæ Bourignon* adi-
dictus : id verò doleo non produiſſe Amici hujus noſtri
Commentarium de Apibus, omnium quæ unquam elabora-
vit Caſtigatiſſimum; hoc opus vernaculo Sermone
ſcriptum cum Iconibus quamplurimis eò ſpectantibus
plus ſemel apud eum vidiſſe me ſatis memini; at ubi
jam latitat ignoro prorſus.

Nuperis Annis magnam celebritatem nacta eſt ob vim
Lithontripticam quæ ipſi aſcribitur, Herba quædam à
Ceylonenſibus Ahmella dicta.   An jam uſpiam exſtet ne-
ſcio; ſed eam colui, cum verſarer in Præfecturâ *Horti
Amſtelod.* Flores fundit in ſummis caulibus perſimiles
Chryſanthemo Curaſſav. *alato caule flo. Aurantiis Par. Bat.*
Semen ei bidens, caules quadrati, fol. Lamii vel Urticæ
(quæ ſubacria ſunt)conjugatis amicti ; undè manifeſtè li-
quet ad Cannabinæ Genus, quod bidens vocat *Cæſalpi-
nus,* eumque ſequutus *Tournefortius,* ſpectare ; neque
fortè inconcinnè nuncupari poſſe *Cannabinam aut biden-
tem Urticæfoliam Indicam Lithontripticam.*

Noviſſimè quoque increbuit uſus *Fabæ,* quam vocant,
di Sto. Ignatio ; dicitur & *Higoſur* & Faba di St. *Nicolas* &
de *Cava longa.* Semen eſt amariſſimum, quod nullam
                                                    Fabæ